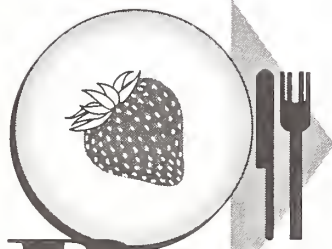


Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

41157
F66
8943



Food & Nutrition Research Briefs

July 2000

Hip, Hip Hurray for Vitamin K

More evidence that vitamin K helps maintain strong bones comes from a new look at data from 888 elderly men and women participating in the Framingham Heart Study between 1988 to 1995. Those who reported the lowest daily vitamin K intakes in 1988 had experienced significantly more hip fractures by the 1995 examination than those reporting the highest intakes. There was no relationship between bone mineral density and vitamin K intakes, however.

Dark-green leafy vegetables, like spinach and broccoli, are rich in vitamin K—known chemically as phyloquinone. One serving of spinach or two servings of broccoli provide four to five times the Recommended Dietary Allowance of 65 to 80 micrograms daily. The lowest intakes in this study averaged 56 micrograms; the highest 254 mcg.

The new findings support others reported in 1999. Analysis of data from more than 72,000 women in the Nurses' Health Study showed that low vitamin K intakes increased risk of hip fracture.

Researchers at the ARS-funded center in Boston collaborated on the new study with researchers from the Hebrew Rehabilitation Center for Aged Research and Training Institute, Harvard Medical School and others. They reported their findings in the *American Journal of Clinical Nutrition*, 2000 (vol. 71, pp. 1201-1208).

Contact: Sarah L. Booth, (617) 556-3231, Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, Boston, MA; sbooth@hnrc.tufts.edu

Plant Sterols Lower Cholesterol Even More

People who already eat a low-fat diet to reduce cholesterol might lower it more by consuming products with high levels of plant sterols. That's what happened when the 53 men and women in a study consumed low- and reduced-fat salad dressing containing soybean sterols as part of a low-fat diet.

Cholesterol reductions nearly doubled in the volunteers when they consumed 2.2 grams—about one-half teaspoon—of soybean sterols daily for three weeks of the six-week study. A typical American diet provides approximately 0.25 gram of plant sterol—less than one-eighth the study level—per day.

A number of fat-based foods on the market, such as margarines, have been enriched with plant sterols. While their potential benefits have been studied for decades, this study was unique in examining the sterols as an ingredient in low-fat foods and as part of a tightly controlled low-fat diet. It was partly funded by Lipton. The sterols are similar in structure to cholesterol and most likely lowered the volunteers' cholesterol by limiting its intestinal absorption.

The volunteers began the study with their levels of "bad" (LDL) cholesterol in the mildly elevated range. The low-fat diet alone reduced their total and "bad" cholesterol levels 7.3 and 8.4 percent, respectively. With the sterols, reductions were nearly double: 14.1 and 18.2 percent.

Curiously, cholesterol dropped in five of the 53 volunteers only when they got the sterol esters. Many people with high cholesterol don't respond to a low-fat diet and rely on cholesterol-lowering drugs. The question is: Could dietary plant sterols also help these people?

Contact: Joseph T. Judd or David Baer, (301) 504-9014, Beltsville Human Nutrition Research Center, Beltsville, MD; judd@bhnrc.arsusda.gov; baer@bhnrc.arsusda.gov

For Premies: Less Sugar, Works Great

Tiny, premature infants did just fine when given an intravenous feeding containing far less glucose than in current solutions. Researchers found that the 5-day-old premies were able to make their own glucose using amino acids and fats added to the feeding solution as glucose replacements. This means the amount of glucose in the intravenous solution could safely be reduced, and that would cut the risk of high blood glucose levels without increasing the risk of glucose levels dipping too low.

Healthy, full-term babies are able to break down their glycogen, fat and protein stores to make glucose. But very premature infants are born before these stores develop. So they are given extra glucose to prevent a brain-damaging drop in their blood glucose levels and to meet their energy needs. That often produces high blood sugar, however.

When this happens, they lose precious sugar, water and salts through the urine, putting them at risk for dehydration and electrolyte imbalances. Excess glucose can also affect the amount of carbon dioxide premature infants produce, exacerbating problems for those with lung disorders.

To test their metabolic capacity, the researchers cut the glucose infusion rate by 75 percent in 20 very premature infants while providing amino acids and a fat emulsion. Despite this reduction, blood glucose levels remained in the normal range for all infants throughout the 8- to 12-hour study period.

Tracers showed that the majority of the glucose the infants produced was derived from the fat and amino acids in the intravenous solution, confirming that they could use their own metabolic pathway to make glucose when needed. Background on this research can be found in *Diabetes*, 1999 (vol. 48, pp. 7991-800).

Contact: Agneta Sunehag, (713) 798-6725, Children's Nutrition Research Center at Baylor College of Medicine, Houston, TX; asunehag@bcm.tmc.edu

Low-Cal Shakes Are a Hit With Adults

Results are in: Adults love the taste of ARS' reduced-sugar, low-fat milk shakes. The shakes have less than half the sugar and only about 10 percent of the fat in commercial shakes. The new drinks are a remake of a low-sugar variety developed in the 1970s for USDA's School Lunch Program.

Kids weren't crazy about them, however. Last fall, ARS opened its doors to about 600 youngsters who tasted the chocolate shakes. Some comments: "not sweet enough," "there's an aftertaste," and "taste like cereal." An agency scientist is working under a cooperative agreement with Devine Foods, Inc., in Philadelphia, Pa., to refine the shakes and further develop them as a commercial product.

The shakes are based on ARS' technology and contain Devine's patented composition, which reduces fat and calorie content. Fiber content is about 2 to 2.2 percent, which qualifies the shakes as a good source of fiber. A 10-ounce shake has as much calcium, vitamins, and minerals as a serving of milk but has fewer calories. It also has significantly less lactose.

Contact: Richard Konstance, (215) 233-6600, Eastern Regional Research Center, Wyndmoor, PA; rkonstance@arserrc.gov

Double Jeopardy for Foodborne Pathogens

Now there's a laboratory test that simultaneously detects *Salmonella* and a deadly form of *E. coli*—O157:H7. Developed and validated by ARS scientists, the new test uses a technique called fluorescent polymerase chain reaction (PCR) to detect the two foodborne pathogens. Evaluations so far show that the test detects between one and 10 bacterial cells in cultured samples of meat and feces.

The samples are cultured for 6 to 16 hours prior to performing PCR, which requires only 4 hours. This makes the new test several hours faster than standard culturing techniques now used to detect these two pathogens. Researchers validated the test by checking artificially contaminated beef and chicken as well as cattle feces. The test would be just as accurate on pork.

The meat-processing industry, which slaughters more than \$50 billion worth of livestock annually, could use this technology to meet current federal regulations that mandate zero tolerance for visible fecal contamination and for *E. coli* O157:H7. Each year, about 40,000 reported cases of salmonellosis and 73,000 estimated cases of diarrheal illness due to O157:H7 occur in the United States.

Contact: Vijay K. Sharma, (515) 663-7279, National Animal Disease Center, Ames, IA; vsharma@nadc.ars.usda.gov

Cancer-Fighting Milk—The New Graze?

A change in the way U.S. dairy cows are fed may give consumers one more healthful reason to drink milk. Cows grazing pastures, or fed diets containing vegetable oil, produced five times more of a cancer-fighting compound—conjugated linoleic acid (CLA)—than cows fed conventional diets. The human body doesn't produce CLA on its own, but the compound is available through foods such as whole milk, butter, beef and lamb.

An ARS dairy scientist increased CLA levels in milk from cows fed typical confinement rations by adding whole soybean and linseed oils to a typical corn-alfalfa diet. This boosted the CLA content in the cows' milk to levels obtained from grazing, the researchers reported in the *Journal of Dairy Science*, 2000 (vol. 83, pp. 1016-1027). The findings may also increase interest in grazing for dairy cows. Currently, only 10 to 12 percent of U.S. dairy cows are grazed.

Laboratory animals given CLA in their diets have shown a reduction in several types of cancers and a slower progression of atherosclerosis, a contributor to heart disease. Today, human studies of CLA are under way at several research institutions.

Contact: Larry Satter, (608) 264-5353, U.S. Dairy Forage Research Center, Madison, WI; lsatter@dfrc.wisc.edu

High-Selenium Broccoli Vs. Colon Cancer

Is the form of selenium in broccoli more potent against cancer than other food forms of the element or than selenium salts, as some reports suggest? A series of rat studies confirms those reports. ARS nutritionists dramatically reduced early stages of colon cancer in rats by feeding the animals broccoli grown in a high-selenium medium.

Broccoli stores selenium as an amino acid called selenomethyl selenocysteine. Humans and animals simply snip the end off this amino acid to produce the anticancer agent called methyl selenol. The form of selenium prevalent in grains and some meats requires several chemical conversions to produce methyl selenol. Selenium salts—the forms used in some supplements—convert more readily. But it's only one step for the form in broccoli to get there.

Using test rats, the researchers confirmed that these differences in selenium metabolism translated to differences in risk of colon cancer. First, they pitted broccoli having several thousand times the selenium normally found in the vegetable against the selenium salt selenate. After beefing up the rats' selenium levels for several weeks, they injected the animals with a potent carcinogen. High-selenium broccoli always resulted in fewer precancerous lesions than selenate. And the number of precancerous lesions decreased as the dose increased.

Then the scientists confirmed the findings using a different salt—selenite—and a higher dose of selenium. They also challenged the animals with a much more potent carcinogen. Although many more precancerous lesions occurred, the rats fed high-selenium broccoli had half as many as the animals getting selenite. The findings will appear in the September issue of the *Journal of Nutrition*.

For more information, contact John W. Finley or Cindy D. Davis, (701) 795-8353, Grand Forks Human Nutrition Research Center, Grand Forks, ND; jfinley@gfhnrc.ars.usda.gov; cdavis@gfhnrc.ars.usda.gov

Plumcots Are Heading South

A new specialty fruit for the South—Spring Satin—is now available to nurseries. A cross between a plum and apricot, this new cultivar is the first plumcot well adapted to the medium-high chill areas of the South. Plumcots developed in California haven't done well in the South.

Spring Satin produces beautiful, white flowers that bloom in mid-March. In central Georgia, the large, high-quality fruit ripen in late May—a time of year when high-quality fruit is in limited supply. When fully ripe, the short-fuzz plumcots have a very good flavor. They are about two inches in diameter, with reddish-black skin and yellowish-red flesh. This unique cross is tolerant of major plum diseases that make commercial production difficult.

Trees will be available commercially this winter, but consumers will have to wait to try Spring Satin. The trees take about three years to start producing fruit for large-scale distribution.

Contact: William R. Okie, (912) 956-6405, Southeastern Fruit and Tree Nut Research Laboratory, Byron, GA; dokie@byronresearch.net

This B2 Helps Men Live

Two-fifths of the U.S. population may be carrying a gene mutation that reduces risk of heart disease in men—perhaps by as much as 30 percent—according to a study of nearly 3,000 men and women in Framingham, Mass. The mutation, known as B2, is common in all populations studied but previously had not been shown to reduce heart disease risk.

B2 keeps blood levels of the good HDL cholesterol high. And it keeps the size of the HDL particles larger, which also reduces risk. About 40 percent of the study volunteers had at least one B2 mutant among the gene pair. The men with even one B2 had higher HDL and larger HDL particles than those with no mutation. HDL averaged 7 percent higher in the men with a single mutant and 10 percent higher in the men carrying two B2s.

The finding supports clinical evidence that for every 1 percent increase in HDL, cardiovascular disease and death drop 2 to 3 percent. Risk of cardiovascular disease among the nearly 3,000 volunteers was 30 percent lower among the men with at least one B2 mutant, the researchers reported in *Arteriosclerosis, Thrombosis and Vascular Biology*, 2000 (vol. 20, pp. 1323-29). Study leaders at the ARS-funded Boston center collaborated with researchers at several institutions.

Women carrying the mutant also had higher HDL levels and larger HDL particles. But their risk of cardiovascular disease was not significantly different from women with the more common B1 genes. That may be due to women's natural hormonal protection before menopause.

Contact: Jose M. Ordovas, (617) 556-3102, Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, Boston, MA; ordovas_li@hnrc.tufts.edu

Guiltless Doughnuts and More

Fried in shortening, chocolate-glazed, and filled with cream or jelly, doughnuts are a guilty pleasure. But ARS scientists are hoping to ease consumer guilt by reducing the oil content of doughnuts—a breakfast favorite that generates \$4-5 billion in annual sales.

In preliminary trials, doughnuts made from dough containing modified rice starch and other ingredients absorbed as much as 70 percent less oil during frying than traditional, all-wheat doughnuts. Compared to all-wheat doughnuts, which had 24 to 26 grams of oil, some of the wheat-rice flour doughnuts had about 8 grams.

When mixed in with wheat flour, the rice-based ingredients help reduce oil uptake by making the dough more tender, consistent and moist. Though less oily, the doughnuts' taste, texture and other sensory properties are comparable to traditional cake doughnuts. Reduced-oil doughnuts are just one of many potential spin-offs that may benefit rice growers and consumers alike.

Contact: Frederick Shih, (504) 286-4354, Southern Regional Research Center, New Orleans, LA; fshih@nola.srrc.usda.gov

The United States Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD). To file a complaint of discrimination, write USDA, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Ave., SW, Washington, DC 20250-9410 or call 202-720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

Malnourished Children Rally With Amino Acids

Correcting a critical shortage of the body's most potent antioxidant—glutathione—promises to reverse life-threatening complications that kill millions of malnourished Third-World children each year. Findings of this study also could help answer a long-standing question: Why do two very different malnutrition syndromes—one often lethal, the other very easy to treat—develop among children living in the same famine-stricken area?

About half of all malnourished children develop the more serious syndrome called kwashiorkor. Although these children might not appear very wasted, they are difficult to treat, slow to recover and suffer death rates as high as 25 percent. By contrast, children with marasmus exhibit the stick-thin, big-bellied syndrome that most people associate with severe malnutrition, but they quickly respond to treatment and nearly always survive.

Researchers suspected that many of the symptoms of kwashiorkor stemmed from oxidative cell damage caused by a shortage of glutathione. Their suspicions were confirmed in a study conducted at the University of the West Indies, Jamaica, and reported in the *American Journal of Physiology, Endocrinology and Metabolism*, 2000 (vol. 278: E405-412).

Children admitted to the hospital with kwashiorkor had much lower glutathione levels and synthesis rates and higher levels of compounds that signal oxidative cell damage. The problem was traced to a critical shortage of two amino acids: cysteine, which is required for glutathione synthesis, and methionine, which the body can convert into cysteine.

The next phase of the study, in which children diagnosed with kwashiorkor are given cysteine supplements, is already yielding positive results. Glutathione synthesis rates and blood levels are being restored within one week. But the real test will be whether cysteine supplementation improves the children's recovery and survival rates.

Contact: Farook Jahoor, (713) 798-7084, Children's Nutrition Research Center at Baylor College of Medicine, Houston, TX; fjahoor@bcm.tmc.edu

The *Research Briefs* is published quarterly by ARS Information. For further information or addition to the mailing list, contact Judy McBride, nutrition editor, at (301) 504-1628; or write her at 5601 Sunnyside Ave., Rm. 1-2212-b, Beltsville, MD 20705-5129; jmcbride@asrr.arsusda.gov